Interference management for environmental-friendly networks

Résumé du projet de recherche (Langue 1)

The PhD will consider interdisciplinary research in the general area of wireless communication networks, with emphasis in multiuser interference-limited networks of the future, with subtopics potentially including: cooperation in networks, network and MIMO coding techniques, information theoretic bounds, stochastic network optimization, dynamic programming and machine learning, complexity of information extraction, risk management in networks, and applications in sensor networks. Some of the specific topics will consider the fact that we will take a unifying view of interference and complexity, which will allow us to consider interference management solutions under strict delay and complexity constraints. This approach is imperative given that a large fraction of the current state of art in interference management is far from being practically implementable. The second aspect that sets this PhD apart is that we plan to adopt a unifying view of the different methods of interference management, each defined by varying degrees of channel knowledge at the interfering nodes, as well as by varying capabilities of the different nodes. At the two extremes of this spectrum lie powerful but impractical interference alignment solutions that often require astronomical complexity, and on the other extreme lie very rare instances were simple linear solutions result in optimal interference management. The task of the PhD will be to view these jointly. These differentiating aspects hold the promise of jointly providing both theoretical tools for analysis-and-optimization in wireless networks of interfering users, as well as providing clear breakthroughs towards computationally efficient implementation of the novel interference management methods.

Résumé du projet de recherche (Langue 2)

To achieve this objective, the PhD will focus on specific key subareas. The first relates to the fundamental tradeoff between interference management and feedback quality, and seeks to understand the behavior of interference management schemes under varying degrees of channel state information at the transmitter (CSIT), i.e., under reduced and imperfect CSIT. Another major aspect corresponds to how such CSIT can be properly and efficiently disseminated in large networks. The PhD will also search for a unified view by studying the fundamental tradeoff between performance-delay-complexity in interference networks, and then proceed to propose algorithms that are properly designed to meet this tradeoff.